

## REMARKS

New dependent claims 31-33 have been added. No new matter was added. Thus, claims 1, 2, 12-17, 19, 21-24, 29 and 30-33 are pending. The independent claims 1, 2 and 13 of the present application have been amended to distinguish over the prior art of record. No new matter was added. Accordingly, Applicant respectfully submits that the present application is in condition for allowance.

### I. Claim Rejections – 35 USC §103(a)

- A. *In the FINAL Office Action dated March 20, 2009, claims 1, 2, 12-17, 19 and 21-24 are rejected under 35 USC §103(a) as being obvious over U.S. Patent No. 5,964,966 issued to Goyal et al. in view of U.S. Patent No. 6,485,542 B2 issued to Shindo et al.*

#### Regarding Claims 1, 2, 12-14, 19 and 21

In the Final Office Action dated March 20, 2009, claims 1, 2, 12-14, 19 and 21 are rejected based on the “substrate” disclosed by the Goyal et al. patent. The Examiner acknowledges that “Goyal et al. are silent as to the impurity contents of the nickel-based alloys taught therein.” Thus, the above referenced rejection relies on the ‘542 Shindo et al. patent for a teaching of “minimizing impurities” of a Ni-Fe alloy to the levels claimed in the present application. Accordingly, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to minimize the level of impurities in the Ni-Ta alloy “substrate” disclosed by Goyal et al. based on the Ni-Fe alloy of the ‘542 Shindo et al. patent.

Applicant respectfully requests reconsideration and removal of the rejection of claims 1, 2, 12-14, 19 and 21 for each of the following reasons: (i) Goyal et al. teach-away from the texture (i.e. crystal orientation) required by the claims, as amended; (ii) modifying the

“substrate” taught by Goyal et al. such that it is not “biaxially textured” would destroy the intended function of the “substrate” taught by the Goyal et al. patent; (iii) the cited references fail to teach a Ni-Ta sputtering target body; and (iv) it would not be obvious for one of ordinary skill in the art to combine the cited references in any meaningful manner.

Independent claims 1, 2 and 13 of the present application have been amended to require a heat-treated sputtering target body having a recrystallization texture consisting of the claimed alloy. No new matter was added. For example, see page 8, lines 25-26, of the present application, as filed, which states: “Final heat treatment is performed at a recrystallization temperature about 500°C to 950°C to form a substantial recrystallization texture.” Also, see page 9, lines 23-25, and the statement on page 13, lines 3-21, concerning non-recrystallization of the “Comparative Examples”.

For purposes of general scientific information, the Ta in the Ni-Ta alloy required by the present invention (wherein 0.5 to 10at% of Ta is contained in Ni) exists as a solid solution in Ni. Accordingly, the Ta will have the same crystal structure (face-centered cubic lattice) as Ni. This is because Ni does not have very high crystal magnetic anisotropy, and the difference in the passage of magnetic flux is minimal regardless of which face it is facing.

In the case of the composition of the present invention, the alloy will inherently be of random orientation absent special treatment. The present application does not disclose any special treatment for causing the sputtering target to be oriented in any particular direction; thus orientation is inherently random. The rolling process of the present invention is performed only for the purpose of destroying cast structure and refining the structure. The rolling of the present invention is not intended to control crystalline orientation. It is only aimed at destroying cast structure so as to reduce the generation of particles during sputtering. It is clear that the

“recrystallization texture” (i.e., structure) required by claims 1, 2 and 13 of the present application is unrelated and different relative to a structure that is biaxially oriented.

Accordingly, the “recrystallization texture” required by the claims of the present application clearly require a structure (i.e., texture) that is not oriented toward a specific direction (i.e., a crystal structure that is non-oriented).

In the above rejection, the Examiner relies specifically on the “substrate” disclosed by the Goyal et al. patent to reject the sputtering target required by the claims of the present application. More particularly, Goyal et al. disclose a Ni alloy “substrate” having a biaxially oriented structure (or texture) for the specific purpose of forming superconductivity wire. For example, by depositing a superconductivity layer on the biaxial orientation substrate, Goyal et al. cause the layer being deposited on the substrate to also have biaxial orientation required to obtain large critical current density  $J_c$ . Accordingly, the Ni alloy “substrate” of Goyal et al. has a biaxial orientation structure as a requisite condition.

By way of example, see the Abstract of Goyal et al. which refers to “biaxially textured” as being “essential”. Also, see column 1, lines 12-15, of Goyal et al. with respect to the “present invention” being “related to biaxially textured metallic substrates”, and see column 1, lines 30-31, with respect to “large critical current density ( $J_c$ )” being “required”. Further, see column 3, lines 1-3, which states: “Hence, in order to fabricate high temperature superconductors with very critical current densities, it will be necessary to biaxially align all grains.” Finally, as clearly stated on column 5, lines 61-62, and throughout the remainder of the specification of Goyal et al., an object of the invention of Goyal et al. is to “provide biaxially textured metallic substrates.”

Turning to the present invention, it is directed to technology unrelated to superconductivity and requires a crystal structure that is significantly different to the biaxial

orientation required by the “substrate” disclosed by the Goyal et al. patent. The sputtering target of the present invention is required not to be oriented toward a specific direction (i.e., non-oriented, not biaxially oriented). Accordingly, the “substrate” of Goyal et al. relied upon to reject the sputtering target claimed in the present application clearly has a different crystal structure than that required by the “heat-treated sputtering target body having a recrystallization texture” of claims 1, 2 and 13 of the present application.

“Teaching away” is the antithesis of the art suggesting that the person of ordinary skill in the art go in the claimed direction. Essentially, “teaching away” is a per se demonstration of lack of obviousness. In re Fine, 873 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Goyal et al.’s requirement that the substrate have biaxial orientation clearly teaches away from the random orientation (i.e., recrystallization texture) required of the heat-treated sputtering target body required by claims 1, 2 and 13 of the present application. A non-oriented structure is required if the body is to be able to deposit a uniform thin film without the generation of particles during a sputtering operation such as required by the present invention.

For at least this reason, Applicant respectfully requests reconsideration and removal of the obviousness rejection of claims 1, 2, 12-14, 19 and 21 of the present application.

In addition, kindly also consider that when a §103 rejection is based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in the reference, such a proposed modification is not proper and a *prima facie* case of obviousness cannot be properly made. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

The intent, purpose and function of Goyal et al. are to provide a “substrate” for a superconductor. The substrate is required to have a crystal structure of a so-called “biaxial orientation” comprising a (100) face in relation to the planar direction and a <001> axis in

relation to the rolling direction. The reason for the biaxial texture is that high current density characteristics greatly depend on the orientation of the superconductor film. Goyal et al. obtains the biaxial texture with a sharp cube texture obtained by applying “heavy” rolling reduction exceeding 90% to the alloy in which the stacking fault frequency parameter at the time of 60% deformation is less than 0.01.

To use the “substrate” of Goyal et al. as a sputtering target, the “substrate” would require modification to random orientation. However, eliminating the biaxial orientation of the “substrate” of Goyal et al. would destroy the intent, purpose and function of the invention disclosed in the Goyal et al. patent.

For at least this additional reason, Applicant respectfully requests reconsideration and removal of the obviousness rejection of claims 1, 2, 12-14, 19 and 21 of the present application.

Still further, Applicant respectfully submits that Goyal et al. fail to disclose a Ni-Ta sputtering target. One of ordinary skill in the art at the time of the present invention is taught by Goyal et al. on column 10, lines 24-39, with respect to a nickel alloy including tantalum, that:

“**These alloys** can be deformed to deformations greater than 90% prior to a final annealing step by employing a rolling process wherein a thickness of less than 20 mils is achieved. Said rolled and annealed sheet can be used as a substrate for epitaxial growth of oxides and nitrides.”

Also, see column 12, lines 22-30, of Goyal et al. which states:

“Another embodiment of the subject invention comprises a binary alloy of ... 10at% or less of Ta ... **These alloys** can be cube textured by rolling to deformations greater than 90% prior to final annealing. Said rolled and annealed article sheet can be used as a substrate for epitaxial growth of oxides and nitrides ...”

On column 12, lines 31-33, Goyal et al. state that “It is **not possible to deform alloys of certain compositions** to the reductions required to produce sharp biaxial textures required for applications.” (Of course, this statement is clearly not directed to a Ni-Ta alloy based on the

above recited specific disclosure provided by the Goyal et al. patent.) In fact, the only example provided for the “certain composition” is a “Hastealloy C” deposited on a “thin strip of biaxially textured Cu.” See column 12, lines 40-46, of the Goyal et al. patent.

Hastealloy C is clearly of a completely different composition than that of the claimed Ni-Ta alloy. One of ordinary skill in the art at the time of the present invention would not find it obvious to stretch the interpretation of a sputtering target made of Hastealloy C to a sputtering target made of an entirely different composition with entirely different chemical and physical properties and characteristics. Further, one of ordinary skill in the art is provided with no motivation for producing a sputtering target from a material that can be readily rolled and annealed into a desired biaxially textured “substrate”.

Accordingly, Goyal et al. clearly teach to one of ordinary skill in the art that a Ni-Ta alloy “substrate” is produced via rolling and annealing, not sputtering. According to the teachings of Goyal et al., the use of sputtering is used only for “certain compositions” which are clearly defined as being “those compositions” that cannot be deformed to the reductions required to produce sharp biaxial textures. The Ni-Ta composition is clearly not one of “those compositions”. For this reason, Applicant respectfully submits that one of ordinary skill in the art following the teachings of Goyal et al. would not look to sputtering for a means of forming a Ni-Ta biaxially textured “substrate”.

For at least these additional reasons, Applicant respectfully requests reconsideration and removal of the obviousness rejection of claims 1, 2, 12-14, 19 and 21 of the present application.

Finally, the ‘542 Shindo et al. patent describes a Ni-Fe alloy sputtering target and a method of manufacturing a Ni-Fe alloy sputtering target including the steps of dissolving raw material Ni and Fe in hydrochloric acid to obtain a chloride solution and contacting this chloride

aqueous solution with an ion exchange resin to eliminate metal ions as impurities. Nonetheless, Ta required by the Ni alloy “substrate” of Goyal et al. (and the claims of the present application) is a substance that is insoluble in hydrochloric acid. Thus, it is not possible to dissolve the Ta raw material of Goyal et al. (and the present invention) in hydrochloric acid to obtain a chloride solution. Thus, it would not be possible for one of ordinary skill in the art following the teachings of the ‘542 Shindo et al. patent to achieve high purification of the Ni-Ta alloy material of Goyal et al. according to the purification process taught by the ‘542 Shindo et al. patent. Thus, neither of the cited references enables one of ordinary skill in the art to obtain the ultra-high purification of a Ni-Ta alloy.

For at least this additional reason, Applicant respectfully requests reconsideration and removal of the obviousness rejection of claims 1, 2, 12-14, 19 and 21 of the present application.

Regarding Claims 15, 16, 22 and 23

The above referenced claims of the present application are directed to a nickel alloy sputtering target (according to base claim 1 or 2) having an initial magnetic permeability of in-plane direction of 50 or more and/or a maximum magnetic permeability on an initial magnetization curve of in-plane direction of the target of 100 or more.

In the Office Action, the Examiner readily admits that “Goyal et al. is silent as to the magnetic permeability of the nickel alloy.” However, these claims are rejected on the basis that the Goyal et al. “substrate” is “identical or substantially identical” to the sputtering target claimed by the present application and that the “substrate” would be “expected to possess the same properties” such as magnetic permeability.

Applicant respectfully disagrees and requests reconsideration.

On page 11, Table 2, of the present application, as filed, the initial and maximum magnetic permeability of various Examples according to the present invention and Comparative Examples not according to the present invention are listed. As clearly stated in the present application, magnetic permeability will change based on heat treatment conditions (even if Ta content is the same). See page 8, line 28, to page 9, line 1, of the present application, as filed. Also, see page 12, lines 19-25 concerning the “Comparative Examples” having the same additive amount of Ta as the Examples according to the present invention but different heat treatment. More specifically, see page 13, lines 3-5, 10-13, and 18-20 which state that since heat treatment temperature was too low in Comparative Examples 1-3, 1-4, 2-1, 2-2 and 3-1, the initial magnetic permeability and maximum magnetic permeability could not be improved.

The reason for the above is that maximum magnetic permeability will increase as a result of the residual strain being eliminated based on the heat treatment. Thus, since the maximum magnetic permeability will vary considerably depending on the amount of strain of the alloy, the magnetic permeability will not necessarily be the same even for the same composition.

Thus, Applicant respectfully requests reconsideration and removal of the argument that the “substrate” of Goyal et al. will be “expected” to have the same properties such as magnetic permeability simply because it has an identical or substantially identical composition. To the contrary, maximum magnetic permeability varies considerably depending on the amount of strain within the alloy. Thus, maximum magnetic permeability will not necessarily be the same in the “substrate” of Goyal et al. relative to the sputtering target of the present invention, even assuming the same composition.

For at least this additional reason, Applicant respectfully requests reconsideration and removal of the obviousness rejection of claims 15, 16, 22, and 23 of the present application.



In conclusion, Applicant respectfully requests reconsideration and removal of the above stated obviousness rejections of claims 1, 2, 12-17, 19 and 21-24 based on Goyal et al. in view of the '542 Shindo patent for any of the reasons discussed above.

*B. In the FINAL Office Action dated March 20, 2009, claims 1, 2, 12-17, 19, 21-24, 29 and 30 are rejected under 35 USC §103(a) as being obvious over U.S. Patent No. 5,964,966 issued to Goyal et al. in view of U.S. Patent No. 7,435,325 B2 issued to Shindo et al. (which is the English equivalent of WO 03/014421 A1)*

Applicant respectfully requests reconsideration and removal of the above referenced rejection for procedural reasons.

The present application is the U.S. national phase entry of International PCT Application No. PCT/JP2003/012777 filed on October 6, 2003. The International PCT Application claims priority to Japanese Patent Application No. JP 2003-004685 filed on January 10, 2003. An English translation of JP 2003-004685 with an executed Verification of Translation document is being filed with this Amendment. The disclosure of the English translation of the priority document is identical to the disclosure provided by the International PCT application. Thus, the subject matter of claims 1, 2, 12-17, 19, 21-24, 29 and 30 of the present application are fully supported by the Japanese priority document. Accordingly, the benefit of the filing date of January 10, 2003 should be afforded to the present application and is requested.

U.S. Patent No. 7,435,325 B2 (and its corresponding U.S. Application Publication) fails to qualify as prior art under 35 USC §102. This is because the cited U.S. patent and its application publication were published after October 6, 2003 and do not qualify as prior art under §102(e). Accordingly, this U.S. patent and its application publication cannot be cited under §103.

WO 03/014421 A1 corresponds to U.S. Patent No. 7,435,325 B2. It was published on February 20, 2003 and is considered prior art as of February 20, 2003. Thus it may qualify as prior art under 35 USC §102(a) (however, it clearly fails to qualify as prior art under §102(b) or §102(e)).

For reasons discussed above, Applicant respectfully submits that the claims of the present application are supported by the disclosure of the priority document and therefore obtain the benefit of priority to January 10, 2003. Accordingly, Applicant respectfully submits that WO 03/014421 A1 has been sworn-behind and should be removed from further consideration as prior art properly citable under 35 USC §102 or §103.

For this reason, Applicant respectfully requests removal of the above referenced rejection.

## **II. New Claims 31-33**

New dependent claims 31-33 have been added. Applicant respectfully submits that no new matter was added.

As stated above, page 8, lines 25-26, of the present application, as filed, states: "Final heat treatment is performed at a recrystallization temperature about 500°C to 950°C to form a substantial recrystallization texture."

For purposes of general scientific information, the Ta in the Ni-Ta alloy of the present invention (wherein 0.5 to 10at% of Ta is contained in Ni) will exist as a solid solution in Ni. Accordingly, the Ta will have the crystal structure (face-centered cubic lattice) as Ni and inherently will be random or non-oriented. In the foregoing case, it is difficult to orient the plane in a specific direction without highly specialized treatment. The process steps of the present

invention do not include any special treatment to cause orientation toward a pre-defined direction or directions, thus it will inherently have random orientation, and it clearly will not have biaxial orientation. Thus, Applicant respectfully submits that a heat-treated sputtering target body having a recrystallization texture as disclosed by the present invention is unrelated to a structure that is biaxially oriented and will, in fact, be non-oriented for the reasons stated above. Accordingly, Applicant respectfully submits that the present application and disclosed manufacturing process inherently imply a target that is “non-oriented” as required by new claims 31-33.

### **Conclusion**

In view of the above amendments and remarks, Applicant respectfully submits that the rejections have been overcome and that the present application is in condition for allowance. Thus, a favorable action on the merits is therefore requested.

Please charge any deficiency or credit any overpayment for entering this Amendment to our deposit account no. 08-3040.

Respectfully submitted,  
Howson & Howson LLP  
Attorneys for Applicants

By /William Bak/  
William Bak  
Reg. No. 37,277  
501 Office Center Drive  
Suite 210  
Fort Washington, PA 19034  
(215) 540-9216